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6/9/98 James M. Shlens
Date Signature

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Atty. Dkt. No.: PCOA:673--1

Prior Application Examiner:
J. Dodge

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Classification Designation:

Prior Group Art Unit: 1723

REQUEST FOR FILING CONTINUATION APPLICATION
UNDER 37 C.F.R. § 1.53(b)

This is a request for filing a continuation application under Rule 53(b) (37 C.F.R. § 1.53(b)) of co-pending prior U.S. patent application Serial No. 08/763,719 filed December 13, 1996, entitled "Modified Atmosphere Package for Cut of Raw Meat (As Amended)" which is a continuation-in-part of U.S. patent application Serial No. 08/627,137 filed April 3, 1996 entitled "Modified Atmosphere Package for Cut of Raw Meat".

1. Enclosed is a copy of the prior application Serial No. 08/763,719 as originally filed, including specification, claims, drawings, and declaration. The undersigned hereby verifies that the attached papers are a true copy of the prior application as

originally filed and identified above, that no amendments (if any) referred to in the declaration filed to complete the prior application introduced new matter therein, and further that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statement may jeopardize the validity of the application or any patent issuing thereon.

- (a) The inventorship is the same as prior Application Serial No. 08/763,719.
- (b) Deletion of inventor(s). Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. § 1.63(d)(2) and 1.33(b).
2. Enclosed is a check in the amount of \$790.00 to cover the filing fee as calculated below and the fee for any new claims added in the Preliminary Amendment referred to in Clause No. 7 below.

CLAIMS AS FILED IN THE PRIOR APPLICATION
LESS CLAIMS CANCELED BELOW

FOR	NUMBER FILED	NUMBER EXTRA	RATE	FEE
Basic Fee -----				\$790.00
Total Claims	15 - 20 =	0 X	\$22.00 =	\$ -0-
Independent Claims	2 - 3 =	0 X	\$82.00 =	\$ -0-
Multiple Dependent Claim(s) -----				\$ -0-
TOTAL FILING FEES:				\$790.00

- 3. Applicant is entitled to Small Entity Status for this application.
 - (a) A small entity statement is enclosed.
 - (b) A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
 - (c) Small entity status is no longer claimed.
- 4. If the check is missing or insufficient, the Assistant Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 to 1.21 which may be required for any reason relating to this document, or credit any overpayment to Arnold, White & Durkee Deposit Account No. 01-2508/PCOA:673--1.
- 5. Enclosed is a copy of the current Power of Attorney in the prior application.
- 6. Address all future communications to:

Ronald B. Coolley
ARNOLD, WHITE & DURKEE
P. O. Box 4433
Houston, Texas 77210
312/744-0090
- 6. The prior application is presently assigned to Tenneco Packaging Inc..
- 7. Enclosed is a preliminary amendment. Any additional fees incurred by this amendment are included in the check at No. 2 above and said fee has been calculated after calculation of claims and after amendment of claims by the preliminary amendment.
- 8. Cancel in this application claims 1 to 15 of the prior application before calculating the filing fee.

9. Amend the specification by inserting before the first line the sentence: --This is a continuation of co-pending application Serial No. 08/763,719 filed December 13, 1996, which is a continuation-in-part of U.S. patent application Serial No. 08/627,137 filed April 3, 1996--.
10. Enclosed are formal drawings.
11. An Information Disclosure Statement (IDS) is enclosed.
- (a) PTO-1449.
- (b) Copies of IDS citations.
12. Other: _____.
13. Return Receipt Postcard (should be specifically itemized).

Michael J. Blankstein

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312/744-0090

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
DelDuca et al.

Serial No.: Unknown

Filed: June 9, 1998

For: MODIFIED ATMOSPHERE PACKAGE
FOR CUT OF RAW MEAT

Group Art Unit: Unknown

Examiner: Unknown

Atty. Dkt. No.: PCOA673--1/BLM

PRELIMINARY AMENDMENT

Box PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

Sir:

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Please amend the above-identified patent application as follows:

IN THE CLAIMS:

Please cancel claims 1-15.

Please add new claims 16-30 as follows:

16. (New) A modified atmosphere package comprising first and second compartments separated by a partition member, said partition member including a non-barrier portion substantially permeable to oxygen, said first and second compartments being encompassed by an outer wall substantially impermeable to oxygen, said first compartment being substantially free of oxygen solely in response to said first compartment being flushed with one or more gases creating a modified atmosphere within said first compartment, said first compartment containing an oxygen scavenger activated with an oxygen scavenger accelerator to substantially absorb residual oxygen within said first compartment after said first compartment is flushed with said one or more gases, said second compartment containing a retail cut of raw meat.

17. (New) The package of claim 16, wherein said partition member includes a tray covered by a stretch film wrapping, said tray and said stretch film wrapping enclosing said second compartment.
18. (New) The package of claim 16, wherein said non-barrier portion of said partition member has a rate of oxygen permeability greater than about 1000 cubic centimeters per 100 square inches in 24 hours.
19. (New) The package of claim 18, wherein said outer wall has a rate of oxygen permeability less than about 0.1 cubic centimeters per 100 square inches in 24 hours.
20. (New) The package of claim 16, wherein said oxygen scavenger is constructed to reduce a level of said residual oxygen to less than about 0.05 percent within 90 minutes after flushing said first compartment.
21. (New) The package of claim 16, wherein said oxygen scavenger includes an oxygen-absorbing packet disposed within said first compartment.
22. (New) The package of claim 16, wherein said oxygen scavenger includes an oxygen-absorbing material integrated into the material used to form said partition member.
23. (New) The package of claim 16, wherein said outer wall includes a plastic bag.
24. (New) The package of claim 16, wherein said retail cut of raw meat is substantially totally enclosed within said second compartment.
25. (New) A method of manufacturing a modified atmosphere package having first and second compartments separated by a partition member, said partition member including a non-barrier portion substantially permeable to oxygen, said first and second compartments being encompassed by an outer wall substantially impermeable to oxygen, said method comprising the steps of:
- placing a retail cut of raw meat within said second compartment;
- sealing said second compartment;
- substantially removing oxygen from said first compartment solely by flushing said first compartment with one or more gases;
- supplying said first compartment with an oxygen scavenger to absorb residual oxygen within said first compartment;

activating said oxygen scavenger with an oxygen scavenger accelerator; and sealing said outer wall.

26. (New) The method of claim 25, wherein said partition member includes a tray covered by a stretch film wrapping, said tray and said stretch film wrapping enclosing said second compartment.

27. (New) The method of claim 26, wherein said outer wall includes a plastic bag.

28. (New) The method of claim 25, wherein said non-barrier portion of said partition member has a rate of oxygen permeability greater than about 1000 cubic centimeters per 100 square inches in 24 hours.

29. (New) The method of claim 28, wherein said outer wall has a rate of oxygen permeability less than about 0.1 cubic centimeters per 100 square inches in 24 hours.

30. (New) The method of claim 25, wherein said oxygen scavenger is constructed to reduce a level of said residual oxygen to less than about 0.05 percent within 90 minutes after flushing said first compartment.

REMARKS

Original claims 1-15 of the present application have been canceled, and new claims 16-30 have been added by this Preliminary Amendment.

The Commissioner is hereby authorized to charge Deposit Account No. 01-2508 (Order No. PCOA673--1) for any omitted fees, except for the issue fee.

Respectfully submitted,

Michael J. Blankstein

Michael J. Blankstein
Reg. No. 37,097
Attorney for Applicant

ARNOLD, WHITE & DURKEE
P.O. Box 4433
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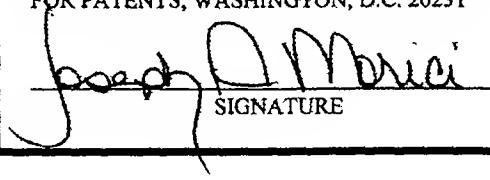
MODIFIED ATMOSPHERE PACKAGE

Be it known that We, Gary R. DelDuca, Alan E. Deyo, Vinod K. Luthra, and Wen P. Wu, citizens of the United States and residing respectively at 82 Howell Street, Canandaigua, New York 14424, 66 S. Main Street, Rushville, New York 14544, 21 Barrington Hills, Pittsford, New York 14534, and 4 Silver Pines Drive, Pittsford, New York 14534, have invented a certain new and useful **MODIFIED ATMOSPHERE PACKAGE**, of which the following is a specification.

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MODIFIED ATMOSPHERE PACKAGE

Cross-Reference to Related Applications

This application is a continuation-in-part of application Serial No. 08/627,137
5 filed April 3, 1996.

Field of the Invention

The present invention relates generally to modified atmosphere packages for
storing food. More particularly, the invention relates to a modified atmosphere package
10 for extending the shelf life of raw meats or other food.

Background of the Invention

Containers have long been employed to store and transfer perishable food prior
to presenting the food at a market where it will be purchased by the consumer. After
perishable foods, such as meats, fruits, and vegetables, are harvested, they are placed into
15 containers to preserve those foods for as long as possible. Maximizing the time in which
the food remains preserved in the containers increases the profitability of all entities in
the chain of distribution by minimizing the amount of spoilage.

The environment around which the food is preserved is a critical factor in the
preservation process. Not only is maintaining an adequate temperature important, but the
molecular and chemical content of the gases surrounding the food is significant as well.
20 By providing an appropriate gas content to the environment surrounding the food, the
food can be better preserved when maintained at the proper temperature or even when it
is exposed to variations in temperature. This gives the food producer some assurance
that after the food leaves his or her control, the food will be in an acceptable condition
when it reaches the consumer.

Modified atmosphere packaging systems for one type of food, raw meats, exposes
these raw meats to either extremely high levels or extremely low levels of oxygen (O_2).
Packaging systems which provide extremely low levels of oxygen are generally
preferable because it is well known that the fresh quality of meat can be preserved longer

under anaerobic conditions than under aerobic conditions. Maintaining low levels of oxygen minimizes the growth and multiplication of aerobic bacteria. Heretofore, low-level oxygen systems, such as the systems proposed in U.S. Patent No. 3,574,642 to Weinke and U.S. Patent No. 5,115,624 to Garwood, have obtained extremely low levels of oxygen by relying upon oxygen evacuation techniques.

In typical prior art packaging systems, a package composed of flexible or rigid gas barrier materials is loaded into an evacuation chamber. The package in the evacuation chamber is subjected to a vacuum which removes as much of the gases surrounding the package as possible. At this point the package is sealed. After the evacuated package is sealed, the raw meat either can be maintained in a "zero" atmosphere environment (commonly referred to as vacuum packaging) or can be refilled with a gas or mixture of gases to provide a modified atmosphere environment. To provide a modified atmosphere environment, the air-evacuated package is typically filled with a mixture of gases consisting of about 30 percent carbon dioxide (CO_2) and 70 percent nitrogen (N_2). Refilling the air-evacuated package with such a mixture of gases is believed to suppress the growth of anaerobic bacteria. The meat in the modified atmosphere package takes on a less desirable purple-red color which few consumers would associate with freshness. This purple-red color, however, quickly "blooms" to a bright red color generally associated with freshness when the package is opened to oxygenate the fresh meat by exposure to air. The package is typically opened immediately prior to display of the fresh meat to consumers so as to induce blooming of the fresh meat just prior to display to the consumers.

Low-level oxygen systems relying upon evacuation techniques to diminish oxygen levels suffer from several disadvantages. For example, such systems operate at exceptionally slow speeds because they require the use of an evacuation device along the packaging line. The evacuation process is time-consuming. Typically, only about four to six evacuated packages can be prepared on a packaging line in one minute. In addition, the evacuation techniques render it difficult to remove any oxygen within a previously wrapped package such as an overwrapped meat tray. The trapped oxygen

raises the residual oxygen level in the package and can also cause billowing and subsequent damage to the package during evacuation.

A need therefore exists for a modified atmosphere package and a system for making that package which overcome the aforementioned shortcomings associated with existing modified atmosphere packages and existing systems for making those packages.

Summary of the Invention

Briefly, the present invention is directed to a new and improved modified atmosphere package for extending the shelf life of food, especially raw meats. Moreover, the present invention is directed to a new and improved modified atmosphere packaging system for producing the foregoing packages which operates at significantly higher speeds than prior art systems and which reduces the oxygen level in the packages without the use of time-consuming evacuation techniques. The packaging system effectively extends the allowable time period between cutting and purchase of retail cuts of raw meat. The raw meat can be cut and packaged several weeks prior to being purchased at the store and yet remains fresh during this time period.

The modified atmosphere package maintains an appropriate contained atmosphere around food being contained therein when stored in an ambient environment.

A modified atmosphere packaging system and method creates a modified atmosphere in the package. In one embodiment, the modified atmosphere package includes an inner package and an outer package. The inner package is composed at least partially of a polymeric material substantially permeable to oxygen, while the outer package is composed of a polymeric material substantially impermeable to oxygen. After a food product such as raw meat is placed within the inner package, the inner package may be flushed with a desired mixture of gases to substantially remove oxygen from the inner package. The flushed inner package is then wrapped and inserted into the outer package without sealing the outer package. Next, the outer package is flushed with the desired mixture of gases to substantially remove oxygen from the outer package. After flushing the outer package, the outer package is sealed. An oxygen scavenger is provided in the modified atmosphere package to substantially absorb any residual oxygen within the

package. The oxygen scavenger is preferably activated with an oxygen uptake accelerator to increase the rate at which the residual oxygen is absorbed.

The above summary of the present invention is not intended to represent each embodiment, or every aspect of the present invention. This is the purpose of the figures and detailed description which follow.

Brief Description of the Drawings

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1 is an isometric view of a modified atmosphere package embodying the present invention;

FIG. 2 is a section view taken generally along line 2-2 in FIG. 1;

FIG. 3 is an enlarged view taken generally along circled portion 3 in FIG. 2;

FIG. 4 is a diagrammatic side view of a system for making the modified atmosphere package in FIG. 1;

FIG. 5 is an elevational view of an alternative embodiment of a modified atmosphere package.

While the invention is susceptible to various modifications and alternative forms, certain specific embodiments thereof have been shown by way of example in the drawings and will be described in detail. It should be understood, however, that the intention is not to limit the invention to the particular forms described. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

Description of the Preferred Embodiment

Turning now to the drawings, FIGS. 1-3 depict a modified atmosphere package including an outer package 12 and an inner package 14. The term "package" as used herein shall be defined as any means for holding raw meat, including a container, carton, casing, parcel, holder, tray, flat, bag, film envelope, etc. At least a portion of the inner package 14 is permeable to oxygen. The inner package 14 includes a conventional semi-

rigid plastic tray 16 thermoformed from a sheet of polymeric material which is substantially permeable to oxygen. Exemplary polymers which may be used to form the non-barrier tray 16 include polystyrene foam, cellulose pulp, polyethylene, polypropylene, etc. In a preferred embodiment, the polymeric sheet used to form the tray 16 is substantially composed of polystyrene foam and has a thickness ranging from about 100 mils to about 300 mils. The use of a common polystyrene foam tray 16 is desirable because it has a high consumer acceptance. The inner package 14 further includes a stretch film wrapping or cover 18 substantially composed of a polymeric material, such as polyvinyl chloride (PVC), which is substantially permeable to oxygen. In a preferred embodiment, the stretch film used to form the cover 18 contains additives which allow the film to cling to itself, has a thickness ranging from about 0.5 mil to about 1.5 mils, and has a rate of oxygen permeability greater than about 1000 cubic centimeters per 100 square inches in 24 hours. Most preferably, the film has a rate of oxygen permeability greater than about 10,000 cubic centimeters per 100 square inches in 24 hours. To help attain this high rate of permeability, small holes may be punched into the film. One preferred stretch film is ResiniteTM meat film commercially available from Borden Packaging and Industrial Products of North Andover, Massachusetts.

The tray 16 is generally rectangular in configuration and includes a bottom wall 20, a continuous side wall 22, and a continuous rim or flange 24. The continuous side wall 22 encompasses the bottom wall 20 and extends upwardly and outwardly from the bottom wall 20. The continuous rim 24 encompasses an upper edge of the continuous side wall 22 and projects laterally outwardly therefrom. A food item such as a retail cut of raw meat 26 is located in a rectangular compartment defined by the bottom wall 20 and continuous side wall 22. The raw meat may be any animal protein, including beef, pork, veal, lamb, chicken, turkey, venison, fish, etc. Prior to fully wrapping the tray 16 with the cover 18, the partially formed inner package 14 may be flushed with an appropriate mixture of gases, typically a mixture of about 30 percent carbon dioxide and about 70 percent nitrogen, to lower the oxygen level in the inner package 14 to about 1.5 to 5.0 percent. The foregoing mixture of gases displaces the oxygen within the inner

package 14 during the flushing operation. After flushing the inner package 14, the tray 16 is manually or automatically wrapped with the cover 18. The cover 18 is wrapped over the retail cut of raw meat 26 and about both the side wall 22 and bottom wall 20 of the tray 16. The free ends of the cover 18 are overlapped along the underside of the bottom wall 20 of the tray 16, and, due to the cling characteristic inherent in the cover 18, these overlapping free ends cling to one another to hold the cover 18 in place. If desired, the overwrapped tray 16, i.e., the inner package 14, may be run over a hot plate to thermally fuse the free ends of the cover 18 to one another and thereby prevent these free ends from potentially unraveling.

The outer package 12 is preferably a flexible polymeric bag composed of a single or multilayer plastics material which is substantially impermeable to oxygen. The polymeric bag 12 may, for example, include a multilayer coextruded film containing ethylene vinyl chloride (EVOH), or include an oriented polypropylene (OPP) core coated with an oxygen barrier coating such as polyvinylidene chloride and further laminated with a layer of sealant material such as polyethylene to facilitate heat sealing. In a preferred embodiment, the polymeric bag 12 is composed of a coextruded barrier film commercially available as product no. 325C44-EX861B from PrintPack, Inc. of Atlanta, Georgia. The coextruded barrier film has a thickness ranging from about 2 mils to about 6 mils, and has a rate of oxygen permeability less than about 0.1 cubic centimeters per 100 square inches in 24 hours. Prior to sealing the peripheral edges of the polymeric bag 12, the inner package 14 is placed within the polymeric bag 12. Also, the bag 12 is flushed with an appropriate mixture of gases, typically about 30 percent carbon dioxide and about 70 percent nitrogen, to lower the oxygen level in the bag 12 to about 0.05 to 5.0 percent. After flushing the bag 12, but still prior to sealing the bag 12, an oxygen scavenger/absorber 28 is placed in the bag 12 external to the sealed inner package 14. The bag 12 is then sealed.

The oxygen scavenger 28 is designed to reduce the oxygen level in the bag 12 at a rate sufficient to prevent discoloration (*e.g.*, browning) of the raw meat 26. Many factors influence the color stability of raw meat, but it has been found that the reduction

of the oxygen level from the 0.05 to 5.0 percent level described about to less than about 0.05 percent within 90 minutes works for all types of raw meat. If there is still oxygen in the bag 12 after this time period, the oxygen scavenger 28 absorbs any remaining oxygen in the bag 12 and any oxygen which might still be trapped within the inner container 14 so as to lower the oxygen level in the bag 12 to about zero percent within 24 hours. The 5 oxygen scavenger 28 also absorbs any oxygen which might permeate into the bag 12 from the ambient environment. To increase the rate of oxygen absorption, the oxygen scavenger is activated with an oxygen uptake accelerator in the form of a predetermined amount of activating agent or by other means just prior to being placed in the bag 12. The 10 oxygen uptake accelerator is preferably selected from the group consisting of water or aqueous solutions of acetic acid, citric acid, sodium chloride, calcium chloride, magnesium chloride and copper.

Further information concerning the oxygen scavenger 28, the oxygen uptake accelerator, and the means for introducing the oxygen uptake accelerator to the oxygen 15 scavenger 28 may be obtained from application serial no. 08/700,644, filed August 8, 1996, entitled "Oxygen Scavenger Accelerator," and incorporated herein by reference. In FIGS. 1-3, the oxygen scavenger 28 is illustrated as a packet or label which is inserted into the bag 12 prior to sealing the bag 12. Alternatively, an oxygen scavenging material may be added to the polymer or polymers used to form the outer package 12 so that the 20 oxygen scavenging material is integrated into the outer package 12 itself.

The retail cut of raw meat 26 within the modified atmosphere package 10 takes on a purple-red color when the oxygen is removed from the interior of the package 10. The meat-filled modified atmosphere package 10 may now be stored in a refrigeration unit for several weeks prior to being offered for sale at a grocery store. A short time (e.g., 25 less than one hour) prior to being displayed at the grocery store, the inner package 14 is removed from the polymeric bag 12 to allow oxygen from the ambient environment to permeate the non-barrier tray 16 and non-barrier cover 18. The purple-red color of the raw meat 26 quickly changes or "blooms" to a generally acceptable bright red color when the raw meat 26 is oxygenated by exposure to air.

FIG. 4 illustrates a modified atmosphere packaging system used to produce the modified atmosphere package 10 in FIGS. 1-3. The packaging system integrates several disparate and commercially available technologies to provide a modified atmosphere for retail cuts of raw meat. The basic operations performed by the packaging system are described below in connection with FIG. 4.

The packaging process begins at a thermoforming station 30 where a tray 16 is thermoformed in conventional fashion from a sheet of polystyrene or other non-barrier polymer using conventional thermoforming equipment. The thermoforming equipment typically includes a male die member 30a and a female die cavity 30b. As is well known in the thermoforming art, the tray 16 is thermoformed by inserting the male die member 30a into the female die cavity 30b with the polymeric sheet disposed therebetween.

The thermoformed tray 16 proceeds to a goods loading station 32 where the tray 16 is filled with a food product such as a retail cut of raw meat 26. The meat-filled tray 16 is then manually carried or transported on a conveyor 34 to a conventional stretch wrapping station 36 where a stretch film 18 is wrapped about the tray 16 to enclose the retail cut of meat 26 therein. The overwrapped tray 16 forms the inner package 14. Just prior to sealing the meat-filled tray 16 at the stretch wrapping station 36, the tray 16 is flushed with a mixture of carbon dioxide and nitrogen to reduce the oxygen level in the tray 16 to about 1.5 to 5.0 percent. The mixture of carbon dioxide and nitrogen emanates from a conventional gas supply hollow tube or rod 40 fed by a gas tank (not shown). The stretch wrapping station 36 may be implemented with a compact stretch semi-automatic wrapper commercially available from Hobart Corporation of Troy, Ohio.

Next, the flushed and sealed inner package 14 proceeds to a high speed form, fill, and seal station 42 which may be implemented with a Fuji-Formost high-speed horizontal form-fill-seal machine commercially available as model no. FW-3700 from Formost Packaging Machines, Inc. of Woodinville, Washington. The inner package 14 may be transported to the form, fill, and seal station 42 by a conveyor 44. At the form, fill, and seal station 42, a web 46 of oxygen barrier film from a roll 47 is arranged to run along the direction of movement of the inner package 14. The web 46 of film is fed to a

conventional forming box which forms a section 48 of the web 46 into a tube configuration encompassing the inner package 14. The tube-shaped section 48 of the web 46 is thermally sealed along a lower fin 50 and is thermally sealed at one end 52 by a pair of vertically-oscillating heated sealing bars 54 or the like.

5 Just prior to sealing the other end 56 of the tube-shaped web section 48 to complete formation of the polymeric bag 12, the web section 48 is flushed with an appropriate mixture of gases, typically about 30 percent carbon dioxide and about 70 percent nitrogen, to lower the oxygen level in the bag 12 to about 0.05 to 5.0 percent. The mixture of carbon dioxide and nitrogen emanates from a conventional gas supply 10 hollow tube or rod 58 fed by a gas tank (not shown). After flushing the web section 48, but still prior to sealing the end 56, the oxygen scavenger/absorber 28 is placed in the web section 48 external to the sealed inner container 14 and the oxygen scavenger 28 is activated with an oxygen uptake accelerator. The end 56 is then conveyed between and sealed by the heated sealing bars 54 to complete formation of the bag 12. In addition to 15 thermally fusing the web section 48 at the end 56, the heated sealing bars 54 sever the web section 48 at the end 56 to separate the bag 12 from the next upstream web section being formed into another bag. The sealed bag 12 is substantially in the form of a sealed bubble or envelope loosely containing the inner package 14 and providing a sealed modified atmosphere surrounding the inner package 14.

20 The oxygen scavenger 28 lowers the oxygen level in the package 10 from the previously described 0.05 to 5.0 percent oxygen level to less than about 0.05 percent within a time period of about 90 minutes. Although the oxygen scavenger 28 is depicted in FIG. 4 as a packet or label inserted into the polymeric bag 12, an oxygen scavenger 25 may alternatively be integrated into the polymers used to form the bag 12. One preferred oxygen scavenger is a FreshPaxTM oxygen absorbing packet commercially available from MultiSorb Technologies, Inc. (formerly Multiform Desiccants Inc.) of Buffalo, New York.

The modified atmosphere packaging system in FIG. 4 can produce the modified atmosphere packages 10 at cycle rates ranging from about 1 to 60 packages per minute.

The maximum cycle rates which can be attained by the system in FIG. 4 are significantly higher than the cycle rates which can be achieved by prior art systems. The attainment of high cycle rates is largely due to the fact that the packaging system in FIG. 4 relies upon the use of simple, commercially available, and high-speed form, fill, and seal equipment, 5 as opposed to the slower evacuation equipment employed by prior art systems. Reducing oxygen levels in the modified atmosphere package 10 by first flushing the package 10 and then subsequently introducing the activated oxygen scavenger 28 into the package 10 is significantly faster and more cost-effective than the reliance upon slow evacuation techniques.

10 While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. For example, as shown in FIG. 5, multiple inner packages 14 may be placed into a single outer package 12. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.
15

What is Claimed is:

1. A modified atmosphere package, comprising:
 - 2 an inner package holding raw meat and including a non-barrier portion substantially permeable to oxygen;
 - 4 an outer package enclosing said inner package and being substantially impermeable to oxygen, said outer package being substantially free of oxygen therein in
 - 6 response to said outer package being flushed with one or more gases creating a modified atmosphere within said outer package; and
 - 8 an oxygen scavenger positioned to substantially absorb residual oxygen within said outer package, said oxygen scavenger being activated with an oxygen uptake
 - 10 accelerator.
2. The modified atmosphere package of claim 1, wherein said non-barrier portion has a rate of oxygen permeability greater than about 1000 cubic centimeters per 100 square inches in 24 hours.
2. The modified atmosphere package of claim 2, wherein said outer package has a rate of oxygen permeability less than about 0.1 cubic centimeters per 100 square inches in 24 hours.
2. The modified atmosphere package of claim 1, wherein said oxygen scavenger is constructed to reduce a level of said residual oxygen at a rate sufficient to prevent discoloration of said raw meat.
2. The modified atmosphere package of claim 4, wherein said oxygen scavenger is constructed to reduce a level of said residual oxygen to less than about 0.05 percent within 90 minutes after flushing and sealing said outer package.
2. The modified atmosphere package of claim 1, wherein said inner package is substantially free of oxygen therein in response to said inner package being flushed with said one or more gases.

7. The modified atmosphere package of claim 1, wherein said oxygen scavenger
2 includes an oxygen-absorbing packet loosely disposed between said inner and outer
packages.

8. The modified atmosphere package of claim 1, wherein said oxygen scavenger
2 includes an oxygen-absorbing material integrated into the material used to form said
outer package.

9. A modified atmosphere package, comprising:
2 inner package means for holding raw meat, said inner package means including a
non-barrier portion substantially permeable to oxygen;
4 outer package means for containing said inner package means, said outer package
means being substantially impermeable to oxygen, said outer package means being
6 substantially free of oxygen therein in response to being flushed with one or more gases
creating a modified atmosphere within said outer package means;
8 oxygen scavenging means for scavenging any residual oxygen within said outer
package means; and
10 means for activating said oxygen scavenging means.

10. A method of manufacturing a modified atmosphere package, said method
2 comprising the steps of:
4 supplying an inner package including a non-barrier portion substantially
permeable to oxygen;
6 placing raw meat within said inner package;
8 sealing said inner package;
supplying an outer package substantially impermeable to oxygen;
inserting said inner package into said outer package without sealing said outer
package;
10 substantially removing oxygen from said outer package solely by flushing said
outer package with one or more gases;

12 supplying an oxygen scavenger positioned to absorb residual oxygen within the
outer package;

14 activating said oxygen scavenger with an oxygen scavenger accelerator; and
sealing said outer package.

11. The method of claim 10, wherein said non-barrier portion has a rate of oxygen
2 permeability greater than about 1000 cubic centimeters per 100 square inches in 24
hours.

12. The method of claim 11, wherein said outer package has a rate of oxygen
2 permeability less than about 0.1 cubic centimeters per 100 square inches in 24 hours.

13. The method of claim 10, wherein said oxygen scavenger is constructed to reduce
2 a level of said residual oxygen at a rate sufficient to prevent discoloration of said raw
meat.

14. The method of claim 13, wherein said oxygen scavenger is constructed to reduce
2 a level of said residual oxygen to less than about 0.05 percent within 90 minutes after
flushing and sealing said outer package.

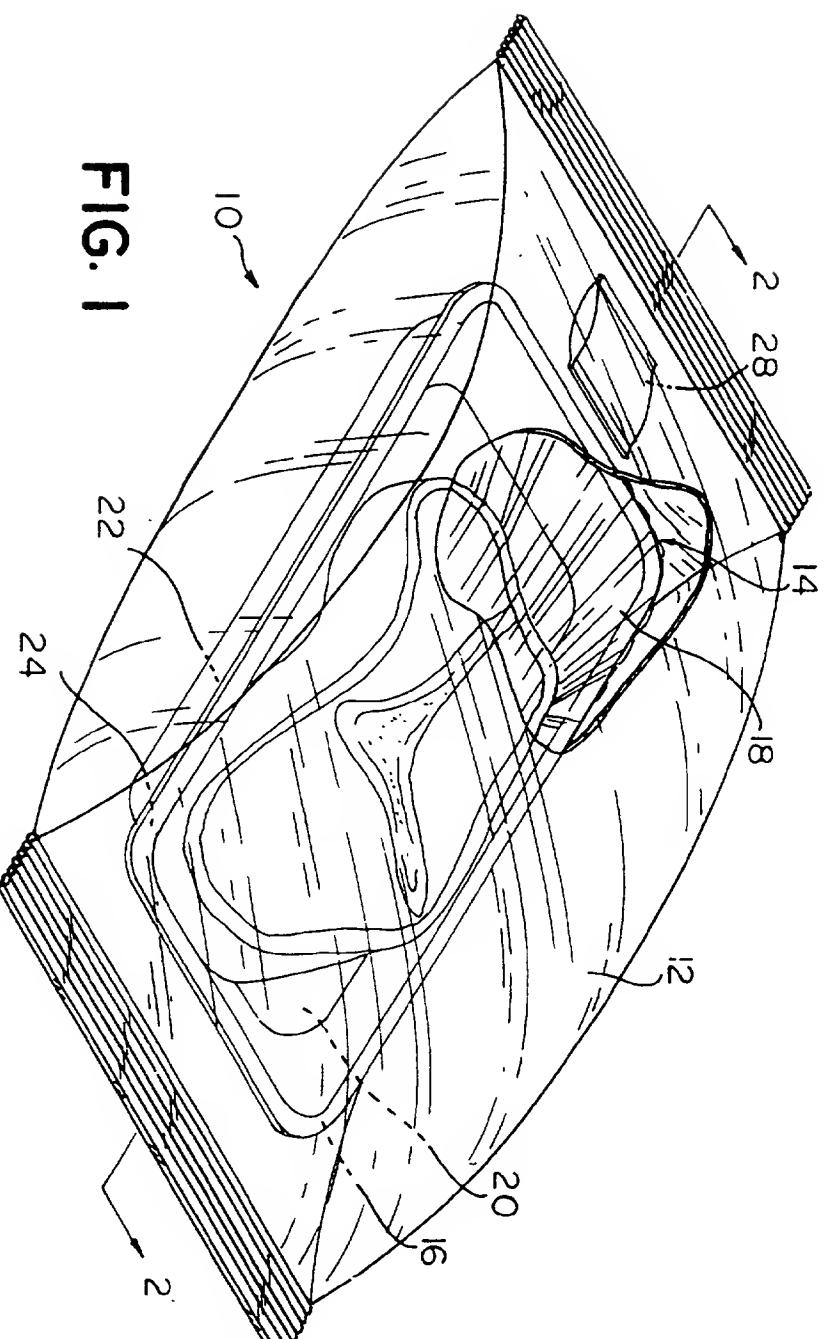
15. The method of claim 10, wherein said step of substantially removing said oxygen
2 from said outer package reduces a level of said oxygen to about 0.05 to 5.0 percent.

ABSTRACT OF THE DISCLOSURE

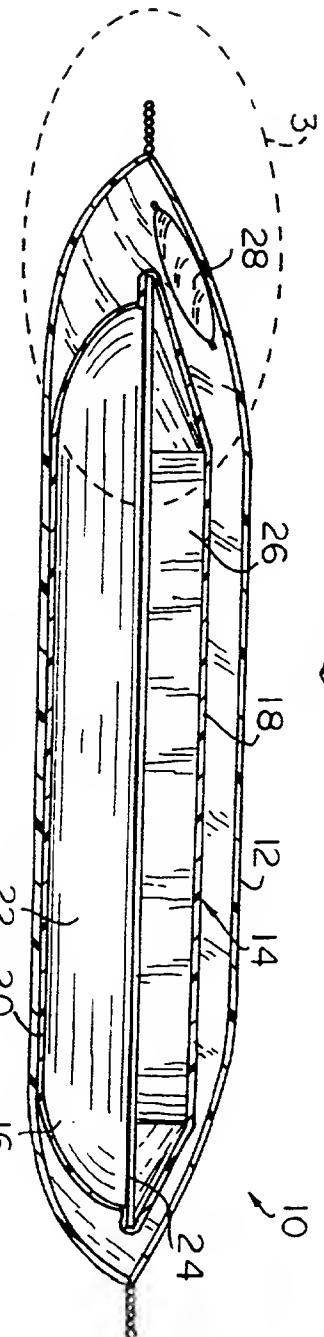
A modified atmosphere packaging method creates a modified atmosphere in a package including an inner package and an outer package. The inner package is composed at least partially of a polymeric material substantially permeable to oxygen, while the outer package is composed of a polymeric material substantially impermeable to oxygen. After a food product such as raw meat is placed within the inner package, the inner package is flushed with a desired mixture of gases to substantially remove oxygen from the inner package. The flushed inner package is then sealed and inserted into the outer package without sealing the outer package. Next, the outer package is flushed with the desired mixture of gases to substantially remove oxygen from the outer package.

5 After flushing the outer package, the outer package is sealed. An oxygen scavenger is provided in the package to substantially absorb any residual oxygen within the package. The oxygen scavenger is activated with an oxygen uptake accelerator to increase the rate at which the residual oxygen is absorbed.

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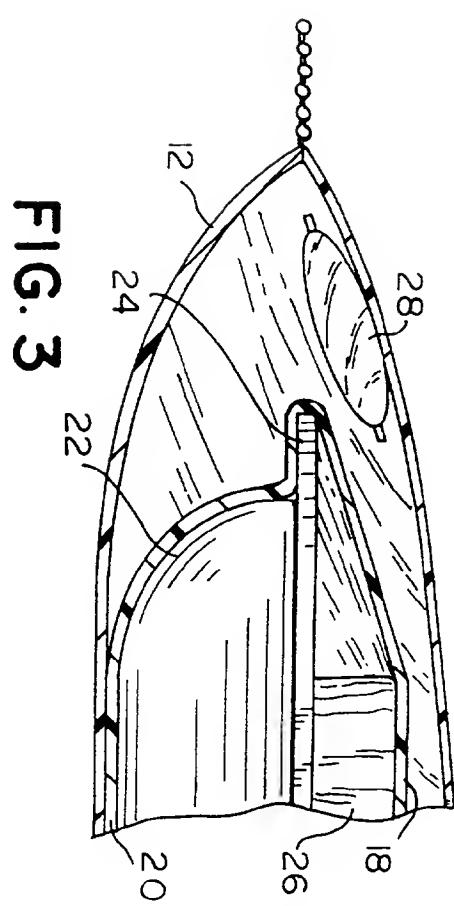


FIG. 3

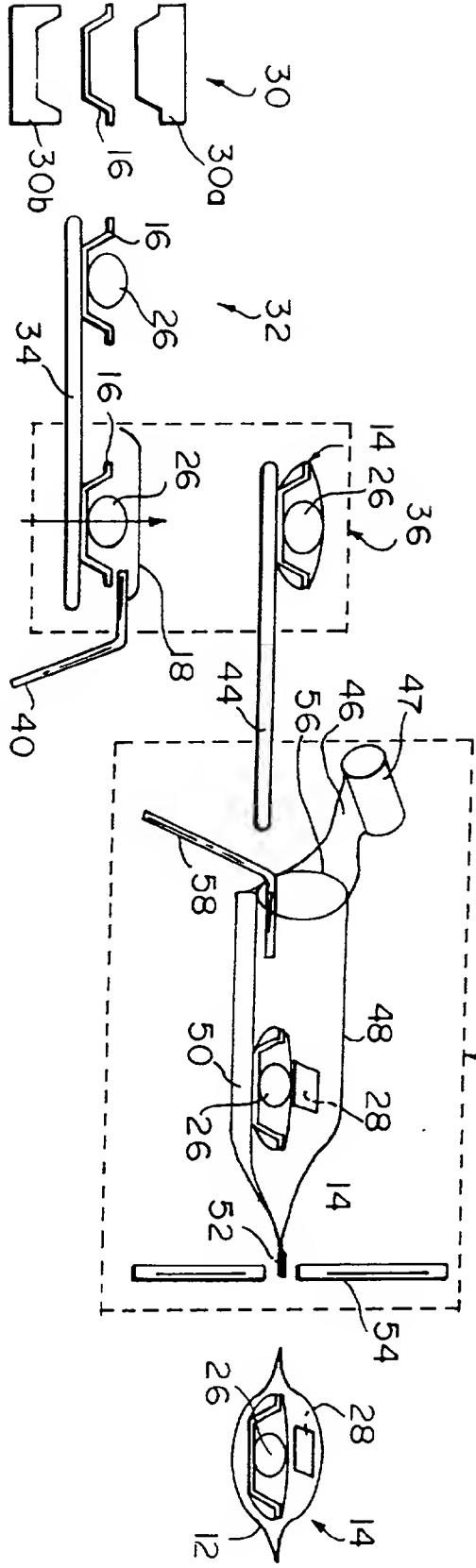
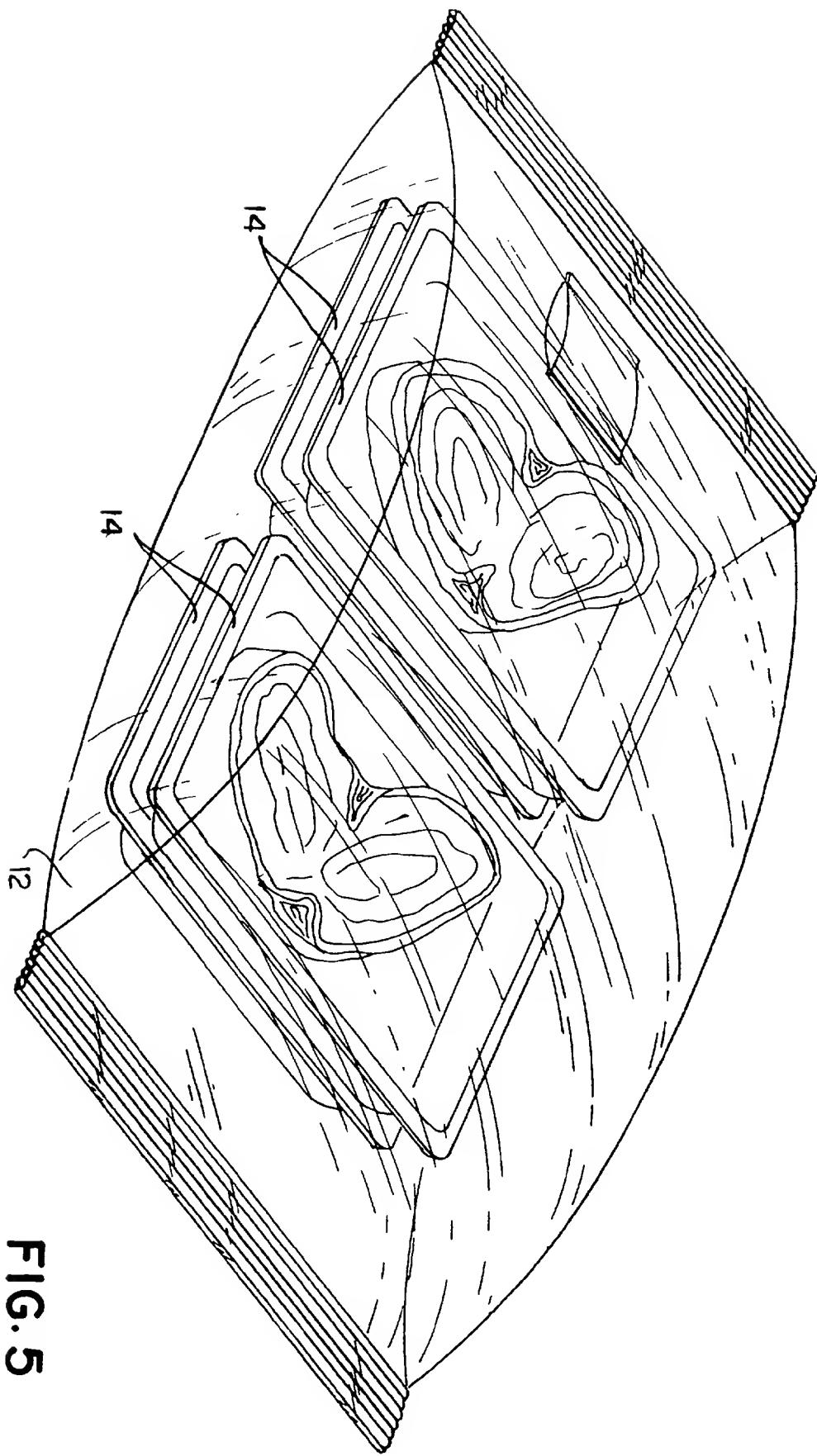


FIG. 4

FIG. 5



DECLARATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **MODIFIED ATMOSPHERE PACKAGE** the specification of which:

X is attached hereto.

— was filed on _____ as Application Serial No. _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)			Priority Claimed
(Number)	(Country)	(Date Filed)	Yes/No
_____	_____	_____	Yes/No
(Number)	(Country)	(Date Filed)	Yes/No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a), regarding events which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

08/627,137 April 3, 1996 Pending
(Application Serial No.) (Filing Date) (Status)

I hereby direct that all correspondence and telephone calls be addressed to Ronald B. Coolley, Arnold, White & Durkee, P.O. Box 4433, Houston, Texas 77210, (312) 744-0090.

I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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